UDC: 62-50

USSR

GUSEV, V. G.

"Determining the Optimal Transfer Function of Digital Automatic Systems by the Algebraic Method"

Moscow, Avtomatika i Telemekhanika, No 5, May 1970, pp 77-87

Abstract: An attempt is made in this article to develop an optimization method for digital systems similar to the method proposed in an earlier work for analog systems. The work referred to is Operatornyye metody v statisticheskoy dinamike avtomaticheskikh sistem (Operator Methods in the Statistical Dynamics of Automatic Systems) by A. N. Sklyarevich, published by Nauka in 1965. The problem set by the author of the present article is solved through the use of z-transformation theory without resorting to frequency-spectral representatives. The problems of minimizing the dispersion and the initial moment of second-order error at an arbitrary instant in the quantizing interval and the evelope error dispersion are examined. A solution is given for the case in which the transfer function of the desired system has poles of arbitrary multiplicity. The author begins his analysis by assuming two steady-state random functions of time, representing the useful and noise signals, at the input of the digital system.
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1/2   006   UNCLASSIFIED   PROCESSING DATE--27NOV70
TITLE--DETERMINATION OF OPTIMAL TRANSFER FUNCITON OF DISCRETE AUTOMATIC
   SYSTEM BY ALBEBRAIC METHOD -U-
AUTHOR--GUSEV, V.G.

COUNTRY OF INFO--USSR

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ABSTRACT/EXTRACT--(U) GP-0- ABSTRACT. THERE ARE CONSIDERED THE PROBLEMS
  OF THE MINIMIZATION OF THE DISPERSION AND THE INITIAL MOMENTUM OF THE
  SECOND ORDER ERROR AS WELL AS THE DISPERSION OF THE ERROR UNDER RANDOM
  INPUT ACTIONS. THE ALGEBRAIC METHOD IS USED TO DETERMINE THE
  COREESPONDING TRANSFER FUNCTIONS OF DISCRETE SYSTEMS. THE PROBLEM IS
  SOLVED WITH THE HELP OF THE METHODS OF THE THEORY OF Z TRANSFORMATION
  WITHOUT RESORTING TO FREQUENCY SPECTRAL REPRESENTATIONS.

UNCLASSIFIED

USSR

GUSEV, V. K., MALYSHEV, G. M., RAZDOBARIN, G. T., SOKOLOVA, L. V.

"Measuring Electron Temperature and Concentration by the Scattering of Laser Radiation in a Plasma on the Tuman-2 Machine"

Abstract: An experimental method for diagnosing a plasma through laser radiation scattering is described. The Tuman-2 used by the authors in the experiments is an axially symmetrical toroidal magnetic trap with longitudinal current. The toroid has a large diameter of 80 cm and a small diameter of 20 cm. Maximum diameter of the plasma cord in the ohmic heating period is 16 cm; the cord is maintained in equilibrium by a programmed transverse magnetic field and by the interaction of the longitudinal current and the housing. The heating of the plasma under the action of the longitudinal current, the uhf field, and the adiabatic compression by the increasing longitudinal magnetic field, is investigated. Measurements of the electron temperature and concentrations were made under the conditions in which the plasma was heated by the discharge current. The authors express their gratitude to V. Ye. Golant, M. G. Kaganskiy, Yu. E. Komach, and Ye. N. Kozlovskiy for their assistance. They are with the Physico-technical Institute
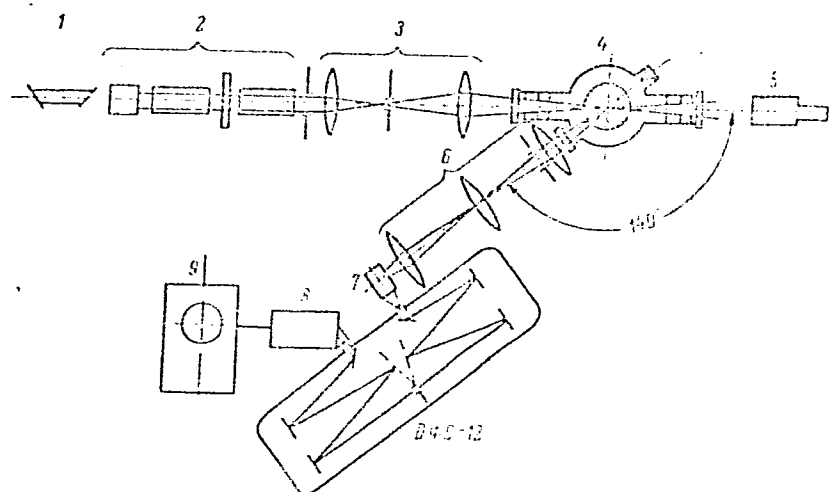1/2

USSR

GUSEV, V. K. et al, Zhurnal tekhnicheskoy fiziki, No 2, 1972, pp 340-343

imeni A. F. Ioffe at Leningrad.

USSR   UDC 547.26'118

KRUGLOV, S. V., IGNAT'YEV, V. M., IONIN, B. I., and PETROV, A. A., Leningrad Technological Institute imeni Lensovet

"Synthesis of Symmetric and Mixed Esters of Diphosphonous Acids"

Abstract: A series of symmetric and mixed acetylene-, allene-, 1,3-diene- and alkendiphosphonates was synthesized. It was shown that hydrogenation of 1,3-dienephosphonates occurs selectively on the 1,4-position. It was established that the Arbuzov rearrangement of trialkyl phosphites with 1,4-dibromobutyne leads to the formation of a symmetric acetylenediphosphonate, while from the 1,4-dichlorobutyne a diphosphonate with a terminal allene group is formed, i.e. the reaction is accompanied by an acetylene-allene isomerization.

USSR

AKIMOV, Yu. S., GUSEV, V. M., KURBATYY, V. I., RYZHIKOV, I. V.

"An Investigation of the Injection Characteristics of Symmetric PIN Diodes Made by the Method of Ion Implantation"

Abstract: The paper presents a review of the principal drift and diffusion theories of double injection as applied to symmetric PIN structures. The width of the I-region varied over a range of $W/L_p = 0.3-15$. Precise knowledge of the parameters of the separate regions of $p^{+}\pi n^{+}$ structures made by ionic doping of high-resistance P-silicon enabled the authors to make a detailed quantitative and qualitative comparison between the experimental characteristics and those predicted by the drift theory and chiefly by the diffusion theory of double injection. It is shown that the Hall diffusion model is inadequate for analyzing the data on PIN structures, and a detailed study is made of the Kleinman section of the current-voltage curve. Experimental data are compared with the theory with regard to nonequilibrium impurity distribution in the heavily doped layers. A drift section pre-

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USSR

AKIMOV, Yu. S. et al., Radiotekhnika i Elektronika, Vol 16, No 10, Oct 71,
pp 1917-1926

ceding the diffusion section is observed on the Rashba-Telpygo-Lampert-Rose
current-voltage curve for long diodes ($W/L_p > 2$), and a detailed study is
made of this section. Six figures, one table, bibliography of 34 titles.

2/2

USSR   UDC 539.216.2.001.5

GUSEV, V. M., GUSEVA, M. I., KURINYY, V. I., TITOV, V. V., TSYPLENKOV, V. S., BARANOVA, Ye. K., STREL'TSOV, L. N.

"Investigation of the Properties of an Oxide Film Obtained by Atomic Oxygen Ion Bombardment of Silicon and Use of Such a Film for Protecting a PN Junction"

Moscow, Radiotekhnika i Elektronika, Vol 16, No 8, Aug 71, pp 1462-1467

Abstract: The paper presents the results of a study of the thickness of oxide films as a function of the conditions of silicon bombardment by atomic oxygen ions, as well as the composition and dielectric properties of the films and the space charge in them. The protective properties of oxide on structures with ion-injected PN junctions are studied. Most of the experiments were done on N-type and P-type silicon with resistivity of 7-10 $\Omega \cdot$cm. The specimens were irradiated in the chamber of the ILU-2 ion accelerator. It was found that the thickness of the oxide film increases in proportion with the energy of the ions and decreases as the ion current density increases. The dielectric strength of the insulating layer was $(3-10) \cdot 10^6$ W/cm. It is shown that the composition of the film depends on subsequent annealing.
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USSR

GUSEV, V. M., et al., Radiotekhnika i Elektronika, Vol 16, No 8, Aug 71, pp 1462-1467

By using ion oxidation to protect ion injected PN junctions, the authors were able to synthesize high-voltage low-power diodes with a breakdown voltage of 3.3 kV.

2/2

USSR   UDC 621.382.3

GUSEV, V.M., SHCHIGOL', F.A., NAUMENKO, V.G., LEVITSKIY, K.S., SHCHELCHKOV, B.I.,
KOZLOV, YU. G., ZAKHAROV, V.I.

"Silicon Planar n-p-nn$^+$ Microwave Transistor Obtained By The Method Of Ion
Implantation"

Translation: The method of ion implantation in conjunction with planar technology
makes it possible to obtain n-p-nn$^+$ microwave transistors with a critical freq-
uency of amplification with respect to the current of f_{τ} - 2 GHz. Specimens were
obtained and investigated with a diffusion base and an ion-implantation emitter,
and devices in which both the collector and emitter junctions were produced by
the method of ion implantation. Basic static and frequency parameters of the
devices are presented and also the dependences V_{ct} - $f(I_e)$, β_f = $f(I_k)$. 3 ill.
6 ref. Summary.

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USSR   UDC: 621.374.4(088.8)

ARTEM'YEV, E. T., GUSEV, V. M.

"A Frequency Multiplication Method"

USSR Author's Certificate No 275155, filed 17 Sep 65, published 18 Nov 70
(from RZh-Radiotekhnika, No 6, Jun 71, Abstract No 6D62 P)

Translation: A method is proposed for frequency multiplication of a sine
waveform by a factor of n. To keep the level of components with the initial
frequency low over a wide frequency band, the input sine voltage is raised
to a power of n, n-2, n-4, n-6, ... by means of nonlinear conversions,
and the output voltages of these converters are added after passing them
through wide-band two-terminal pair networks with transfer constants of
$(1+Cn^2+Cn^4+Cn^3+...)-(Cn^2+2Cn^4+3Cn^6+...)-(Cn^4+3Cn^6+...)-(Cn^6+...)$ respectively,

where $C_n^m = \dfrac{n!}{(n-m)!m!}$

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USSR

UDC: 629.78:533.1

GUSEV, V.N. and KLIMOVA, T.V.

"On Similarity of Hypersonic Jet Flow"

Translation: The problem is investigated of hypersonic jet flow of ideal gas in the framework of compressed layer theory and under condition that the jet flow is equivalent to one-dimensional flow. Similarity criterions are established for highly underexpanded and overexpanded jets, flowing into a flooded space and into a hypersonic flow of the same direction. Comparison of available experimental data with calculation results indicate a good accuracy of the compressed layer method. 7 illustrations. 8 references. Author's resume.

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- 16 -

USSR   UDC 536.24:532.526

GUSEV, V. N., NIKOL'SKIY, YU. V.

"Experimental Study of Heat Transfer at the Critical Point of a Sphere in the Hypersonic Flow of a Rarefied Gas"

Translation: The possibility of using incompletely expanded nozzles in hypersonic wind tunnels to study flow around the models in a broad range of variation of the R_0 number is confirmed in an example of an experimental study of heat transfer at the critical point of a sphere. The experiments were performed in a hypersonic shock tube at Mach numbers of $M < 32$.

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USSR

UDC 621.43.011:533+621.5:533

GUSEV, V. N.

"On the Effect of Viscosity in Jet Flows"

Uch. zap. Tsentr. aero-gidrodinam. in-ta (Scientific Notes of the Central Aerohydrodynamics Institute), 1970, Vol. 1, No. 6, pp 22-30 (from RZh-Mekhanika, No 12, Dec 71, Abstract No 12B594)

Translation: The effect of dissipative processes on the flow of a viscous gas close to the axis of a jet flowing from an underexpanded nozzle into a medium with constant pressure is analyzed on the basis of exact solutions of the one-dimensional Navier-Stokes equations. The characteristics of one-dimensional flow of a viscous heat-conducting gas into a space with constant pressure are analyzed in the case of spherical symmetry. The effect of Reynolds number and pressure drop on the character of the flow is investigated. It is shown that viscosity and heat conductivity considerably change the nature of the flow with a decrease in R, primarily close to the front of the shock wave separating the supersonic and subsonic flow region. Very detailed computational results are given illustrating the effect of R and the pressure drop on the behavior of the flow parameters close to the axis of the nozzle. The calculated

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USSR   UDC: 534.2

GUSEV, V. N., KOGAN, M. N., PEREPUKHOV, V. A.

"On Similarity and Change of Aerodynamic Characteristics in a Transient Region at Hypersonic Flow Velocities"

Uch. Zap. Tsentr. aerogidrodinam. in-ta (Scientific Notes of the Central Aerohydro-dynamic Institute), 1970, 1, No 1, pp 24-33 (from RZh-Mekhanika, No 9, Sep 70, Abstract No 9B320)

Translation: An investigation is made into the aerodynamic characteristics of simply shaped bodies in the transition region between the free molecular limit and the continuous medium limit at hypersonic flow velocities. A dimensionless number to test similarity is found from the Boltzmann equation. It is found that the principal dimensionless gas-dynamic parameter is the Reynolds number with the coefficient of viscosity calculated from the stagnation temperature. A comparison is made between experimental data and theoretical data analyzed with regard to this dimensionless number. Authors' abstract.

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USSR

CHERNYAYEV, V. N., OBICHKIN, YU. G., and GUSEV, V. P.

"Approximate Calculation of Reliability of the Process of the Production of Radioelectronic Equipment on the Basis of Average Group Intensities of Failure of Its Operations"

Abstract: Consideration is given to the possibility of calculating the relia-
bility of the process of the production of radioelectronic equipment prior to
the start of series production. This process is represented as a system con-
sisting of a set of elements which are the production operations, and as the
criterion of reliability of the process is selected the probability of the
dectection of a flaw in output passing through the adjustment operations and/or
undergoing the acceptance tests. On the basis of such representation, it is
possible a) to construct a graph of change of the parameter of flow of failures
of the production process as a function of time; b) to determine the nature of
distribution of the catch-up time between failures of the process of production
of the radioelectronic equipment; c) to conduct an approximate calculation of
reliability of the production process prior to initiation of the series pro-
duction of radioelectronic equipment. 4 tables. 2 references.
1/1

USSR

UDC 621.3.049.5

KUSAYEV, L. I., SILAS, V. P.

"Synthesis of Submodules Comprising Hybrid Film Units and Integrated Circuits"

Sb. nauch. soobshch. Radiotekhn. fak. Dagestan. un-t (Collected Scientific Reports. Radio Engineering Department. Dagestan University), 1970, No 1, pp 120-123 (from RZh-Radiotekhnika, No 10, Oct 71, Abstract No 10V164)

Translation: Submodules are designed by means of a planning experiment permitting derivation of a mathematical model of the submodule which relates the output parameters of the functional units comprising the submodules. Possible versions of connecting the functional units and the mathematical equations defining the basic characteristics of the submodule are presented. When designing a submodule with multipole functional units, it is necessary to achieve a minimum number   of functional units and also the minimum number of lines from input to output, which improves the reliability. There are 3 illustrations and a 2-entry bibliography.

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USSR   UDC 778.534.83

PROVOROV, S. M., GREBENNIKOV, O. F., GUSEV, V. P., PERISEV, S. M.

"A High-Speed Screen Camera for Slow-Motion Photography"

Moscow, Zhurnal Nauchnoy i Prikladnoy Fotografii i Kinematografii, Vol 15, No 4, 1970, pp 269-271

Abstract: The principle of construction of the RKS-21 slow-motion screen camera is presented. The camera can take up to 2 million frames per second and has an equivalent relative apperature of 1 : 4. This camera was developed for use at the Leningrad Forestry Engineering Academy to study woodcutting processes in reflected light. The RKS-21 camera has the same light intensity as the RKS-11 camera previously used for this purpose, but has an exposure frequency one order of magnitude higher. Rather than using rotating diaphragms, as used in screen cameras by Courtney-Pratt in the United States, the camera uses a screen with foreward motion.

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USSR   UDC 534

BORISOV, D. S., GUSEV, V. P., CHERNYAVSKIY, I. T.

"Analog Computer Study of Transverse Oscillations of a Beam With a Disc"

V sb. Dinamika mashin (Machine Dynamics -- Collection of Works), Moscow,
1969, pp 40-43 (from RZh-Mekhanika, No 5, May 70, Abstract No 5A129)

Translation: The results of a study on the "Analak-110" computer of transverse
oscillations of a beam with a disc considering the ellipsoid nature of the
transverse cross section of the beam, the constant transverse force, nonuni-
formity of rotation of the beam and imbalance are presented. It was shown that
the subharmonic resonances observed are explained by the effect of the nonuni-
formity of rotation, the noncircular cross section and the constant transverse
force. Good agreement between the modeling and experiment was found. E. G.
Vol'pert.

1/1

USSR   UDC 621.791.3:669.715+669.14.018.8

KOBYLYANSKIY, I. F., KONONENKO, Yu. F., GUSEV, V. R., TSVETKOV, Yu. F.,
OSIPOVA, K. Ya., LEPANOV, N. S., and CHULKOV, Ye. I., Engineers

"Soldering of Aluminum and Its Alloys With Stainless Steel"

Moscow, Svarochnoye Proizvodstvo, No 11, Nov 70, pp 41-44

Abstract: A method has been developed for fluxless soldering allowing firm
attachment of aluminum and its alloys to steel for parts and units working
at temperatures up to 400°C. The hypoeutectoid alloy produced during
soldering greatly limits the formation and growth of the intermetallide
layer around the soldered joint due to the high heating rate to 640°C and
low force of external clamping of the parts being connected (1 kg/cm^2).

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REEL # 10
Gonyayev, G.S.
to
GUSEV, V.R.